

भारत सरकार/GOVERNMENT OF INDIA
अंतरिक्ष विभाग/DEPARTMENT OF SPACE
विक्रम साराभाई अंतरिक्ष केंद्र/VIKRAM SARABHAI SPACE CENTRE
तिरुवनंतपुरम/THIRUVANANTHAPURAM - 695 022

विज्ञापन सं. वीएसएससी/पी/विज्ञापन/38/2011 दिनांक 29/12/2011

ADVT NO. VSSC/P/ADVT/38/2011 DATED 29/12/2011

भारत के राष्ट्रपति के लिए तथा उनकी ओर से, निम्नलिखित के लिए, प्रधान, क्रय एवं भंडार, विक्रम साराभाई अंतरिक्ष केंद्र (वीएसएससी), तिरुवनंतपुरम मोहरबंद निविदाएं आमंत्रित करते हैं:

For & on behalf of the President of India, the Head Purchase & Stores, Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram invites Sealed Tenders for the following.

सं. NO	निविदा सं. TENDER NO.	विवरण/DESCRIPTION	मात्रा/QTY.	निविदा शुल्क TENDER FEE
1.	3524-2011-5515	वातिक उच्च दाब नियंत्रक / अंशांकन स्टेशन की आपूर्ति, संस्थापन और उसे चालू करना। ब्यौरे अनुलग्नक के अनुसार। यह दो भागवाली निविदा है। भाग-1 (तकनीकी तथा वाणिज्यिक) भाग-2 (मूल्य बोली) Supply, Installation and Commissioning of Pneumatic High Pressure Controller / Calibrating station. Details as per Annexure THIS IS A TWO PART TENDER Part-1 [Technical & Commercial] Part-2 [Price Bid]	1 सं./No.	₹ 225/-
2.	6522-2011-5793	ऑमफिनॉल भाग संख्याओं के अनुसार एमआइएल-सी-26482 के अनुरूप वैद्युत संबंधकों एवं उपसाधनों की आपूर्ति, संस्थापन और उसे चालू करना। ब्यौरे अनुलग्नक के अनुसार। Supply of Electrical connectors & Accessories complying to MIL-C-26482 as per Amphenol Part Nos. Details as per Annexure	1 लॉट/Lot	₹ 225/-
3.	5524-2011-6158	एककालिक टीजी-डीटीए विनिर्देश अनुलग्नक के अनुसार। यह दो भागवाली निविदा है। भाग-1 (तकनीकी तथा वाणिज्यिक) भाग-2 (मूल्य बोली) Simultaneous TG-DTA. Specification as per Annexure THIS IS A TWO PART TENDER Part-1 [Technical & Commercial] Part-2 [Price Bid]	1 सं./No.	₹ 225/-

4.	5552-2011-6165	सेल चक्रण प्रणाली वोल्टता: 0-5 वी, बिजली : 0-200ए, चैनलों की संख्या : 08 विनिर्देश अनुलग्नक के अनुसार। यह दो भागवाली निविदा है। भाग-1 (तकनीकी तथा वाणिज्यिक) भाग-2 (मूल्य बोली) Cell Cycling System Voltage : 0-5 V, Current : 0-200A, No. of channels : 08. Specification as per Annexure THIS IS A TWO PART TENDER Part-1 [Technical & Commercial] Part-2 [Price Bid]	1 सं./No.	₹ 225/-
5.	5524-2011-6166	अवकल क्रमवीक्षण कैलोरीमीटर विनिर्देश अनुलग्नक के अनुसार। यह दो भागवाली निविदा है। भाग-1 (तकनीकी तथा वाणिज्यिक) भाग-2 (मूल्य बोली) Differential Scanning Calorimeter. Specification as per Annexure. THIS IS A TWO PART TENDER Part-1 [Technical & Commercial] Part-2 [Price Bid]	1 सं./No.	₹ 225/-
6.	5524-2011-6225	ऑक्सीजन-नाइट्रोजन-हाइड्रोजन (ओएनएच) विश्लेषक विनिर्देश अनुलग्नक के अनुसार। यह दो भागवाली निविदा है। भाग-1 (तकनीकी तथा वाणिज्यिक) भाग-2 (मूल्य बोली) Oxygen-Nitrogen-Hydrogen (ONH) Analyzer Specification as per Annexure. THIS IS A TWO PART TENDER Part-1 [Technical & Commercial] Part-2 [Price Bid]	1 सं./No.	₹ 225/-
7.	6562-2011-6232	उच्च घनत्व - समानुवर्ती ग्रेफाइट। आकार : व्यास 115 x 140 मि.मी. लंबा। विनिर्देश एवं शर्तें अनुलग्नक के अनुसार। यह दो भागवाली निविदा है। भाग-1 (तकनीकी तथा वाणिज्यिक) भाग-2 (मूल्य बोली) High Density – Isotropic Graphite. Size : Dia 115 x 140mm long. Specification and terms and conditions as per Annexure. THIS IS A TWO PART TENDER Part-1 [Technical & Commercial] Part-2 [Price Bid]	300 सं./Nos.	₹ 225/-

निविदा फॉर्म जारी करने की अंतिम तिथि Last Date for issue of Tender Forms (क्रम सं. against Sl. No. 1, 2, 3 & 4) (क्रम सं. against Sl. No. 5, 6 & 7)	07/02/2012 16.00 बजे तक/up to 16.00 Hrs. 08/02/2012 16.00 बजे तक/up to 16.00 Hrs.
निविदा स्वीकृति की नियत तिथि Due Date for Receipt of Tender (क्रम सं. against Sl. No. 1, 2, 3 & 4) (क्रम सं. against Sl. No. 5, 6 & 7)	08/02/2012 16.00 बजे तक/up to 16.00 Hrs. 09/02/2012 16.00 बजे तक/up to 16.00 Hrs.
निविदा खोलने की तिथि / Tender Opening Date (क्रम सं. against Sl. No. 1, 2, 3 & 4) (क्रम सं. against Sl. No. 5, 6 & 7)	09/02/2012 10.00 बजे/at 10.00 Hrs. 10/02/2012 10.00 बजे/at 10.00 Hrs.

नोट/Note :

1. सामग्री के संपूर्ण ब्यौरे तथा विनिर्देश एवं निविदा प्रस्तुत करने के संबंध में पालन किए जाने के सामान्य अनुदेश निविदा दस्तावेजों में दिए गए हैं।

Full details and specifications of the items and general instructions to be followed regarding submission of tenders are indicated in the tender documents.

2. इसरो वेब साइट www.isro.gov.in / वीएसएससी वेब साइट www.vssc.gov.in में निविदा दस्तावेज उपलब्ध हैं। इच्छुक निविदाकार इन वेब साइटों से अपनी इच्छानुसार निविदा दस्तावेजों को डाउनलोड करें और निविदा अधिसूचना में दिए गए विवरणों के अनुसार अपने प्रस्तावों को निर्धारित निविदा लागत के साथ (बैंक ड्राफ्ट के रूप में) प्रस्तुत करें।

Tender documents are available on ISRO web site www.isro.gov.in / VSSC web site www.vssc.gov.in. Interested tenderers may, at their option download the tender documents from the web sites and submit their offers along with the prescribed tender cost [in the form of Bank Draft] as per details given in the tender notification.

3. निविदा दस्तावेजों को, अनुरोध पर तथा निविदा शुल्क देकर, निम्नलिखित पते से भी प्राप्त किया जा सकता है:
क्रम सं. 1 के लिए : वरि. क्रय एवं भंडार अधिकारी, क्रय यूनिट-II, एटीएफ क्षेत्र, वीएसएससी, इसरो डाक, तिरुवनंतपुरम-695 022. फोन: 0471-2565141.

क्रम सं. 2, 3, 4, 5, 6 तथा 7 के लिए : वरि. क्रय एवं भंडार अधिकारी, क्रय यूनिट-III, आरएफएफ क्षेत्र, वीएसएससी, इसरो डाक, तिरुवनंतपुरम-695 022. फोन: 0471-2563775.

Tender Documents can also be obtained from the following address on request and submission of tender fee :
For Sl. No. 1 : Sr. Purchase & Stores Officer, Purchase Unit-II, ATF Area, VSSC, ISRO Post, Thiruvananthapuram - 695 022, Ph : 0471-2565141.

For Sl. No. 2, 3, 4, 5, 6 & 7 : Sr. Purchase & Stores Officer, Purchase Unit-III, RFF Area, VSSC, ISRO Post, Thiruvananthapuram - 695 022, Ph : 0471-2563775.

निविदा दस्तावेजों के लिए अनुरोध करते समय लिफाफे पर “निविदा दस्तावेजों के लिए अनुरोध-निविदा सं. ----- दिनांक -----” का उल्लेख करें।

While requesting for Tender Documents please indicate on the envelope as “Request for Tender Documents-Tender No..... dt.....”.

4. निविदा शुल्क का भुगतान **मात्र रेखित डिमांड ड्राफ्ट** के रूप में किया जाए। अन्य विधि का भुगतान स्वीकार्य नहीं है। यह डिमांड ड्राफ्ट (क्रम सं. 1 के अधीन मद हेतु) लेखा अधिकारी, यूनिट सं. II, वीएसएससी के नाम पर तथा (क्रम सं. 2, 3, 4, 5, 6 तथा 7 के अधीन मद हेतु) लेखा अधिकारी, यूनिट सं. III, वीएसएससी के नाम पर भारतीय स्टेट बैंक, तुंबा शाखा, तिरुवनंतपुरम – 695 022 पर देय होना चाहिए।

Tender Fee shall be paid in the form of CROSSED DEMAND DRAFT ONLY. Other mode of payment is not acceptable. **The Demand Draft should be in favour of : Accounts Officer, Unit No. II, VSSC (for item under Sl. No. 1) & Accounts Officer, Unit III, VSSC (for item under Sl. No. 2, 3, 4, 5, 6 & 7) payable at State Bank of India, Thumba Branch, Thiruvananthapuram – 695 022.**

[निविदा शुल्क अप्रतिदेय है।/The tender fee is NON-REFUNDABLE]

5. अपने प्रस्ताव को प्रस्तुत करते समय लिफाफे पर स्पष्ट रूप से निविदा सं. तथा नियत तिथि उत्कीर्ण करें तथा ऊपर की क्रम सं. 3 के प्रेषिती को भेजा जाए।

While submitting your offer, the envelope shall be clearly superscribed with Tender No. and Due Date and to be sent to the addressees at Sl. No. 3 above.

6. नियत तिथि/समय के बाद प्राप्त होनेवाली दर सूचियों पर विचार नहीं किया जाएगा।

Quotations received after the Due Date/Time will not be considered.

7. डाक व्यवस्था के कारण, दस्तावेज प्राप्ति में होनेवाले किसी विलंब/अप्राप्ति के लिए वीएसएससी, तिरुवनंतपुरम उत्तरदायी नहीं है।

VSSC, Thiruvananthapuram is not responsible for any postal delay/loss of documents in transit.

8. प्रधान, क्रय एवं भंडार, वीएसएससी, तिरुवनंतपुरम को यह अधिकार होगा कि वे कोई कारण बताए बिना किसी या सभी निविदाओं को आंशिक या पूर्ण रूप से स्वीकार या अस्वीकार करें।

Head Purchase & Stores, VSSC, Thiruvananthapuram reserves the right to accept or reject any/or all the tenders in part or full without assigning any reasons thereof.

हस्ताक्षरित/Sd/-

(टी शशिधरन/T Sasidharan)

वरिष्ठ क्रय एवं भंडार अधिकारी, वीएसएससी/Senior Purchase & Stores Officer, VSSC

Specifications of Pressure Controller / Calibrator

A) Pressure Measurement Specifications

1. Pressure Ranges : Atmosperic to 14 MPa
2. No. of sensors : Multiple sensors (Minimum 4 Nos.) to cover the whole pressure range. Sensors can be internally or externally fitted within a module. However, selection of sensor of appropriate range should be automatic (User independent seamless changeover from one range to another) and controlled by one single controller.
3. Operating Medium : Dry Nitrogen gas
4. Resolution : 1 ppm (User Adjustable)

B) Pressure controller Specifications

It should measure both absolute and gauge mode. Controller should be capable of dynamic compensation for change in atmospheric pressure and capable of auto zeroing while vented at atmosphere. It should also be equipped with automated leak testing routines. Pressure controller should have two modes viz. static mode and Dynamic mode.

1. Static Mode : Sets pressure to target within hold limit and shuts off control in a closed test volume with proper indication / display
2. Dynamic Mode : Sets pressure within hold limit and continuously adjusts pressure to remain at target value with proper indication/ display
3. Control Parameter : Stability limit (User Definable)
4. Typical test volume : 0 to 500 cc
5. Control precision : 4 ppm or better
6. Fluid head correction : Automatic

C) Pressure Sensor Specifications

1. Type of sensor : Quartz Oscillating type (QRPT-absolute Sensor)
2. Precision : 0.008% of reading
3. Stability : 0.005% of reading
4. Measurement Uncertainty : 0.01% of reading for entire range.

D) General specifications

1. Power requirement : Single phase AC, 50 Hz
2. Vibration : As per MIL-T-28800D
3. Communication Interface : RS 232 & USB
4. Software : for Data Acquisition and remote monitoring.

Special conditions :-

- i) Complete specification sheet may be provided along with quotation for comparison purpose.**
- ii) System should be of proven pedigree to ensure maximum reliability in calibration and safety in operation.**
- iii) List of users where the same system is supplied along with the date of installation, address and their telephone numbers should be provided along with the offer.**
- iv) Warranty for a minimum period of one year should be provided. Also performance bank guarantee for 10% of the product cost issued by a reputed bank till the expiry of the warranty period should be provided.**
- v) Work includes installation and commissioning of the system at VSSC.**
- vi) Format for end use certificate, if any required should be provided along with the offer.**

SPECIAL CONDITIONS IN RESPECT OF TWO-PART TENDERS

I. PART - TECHNICAL AND COMMERCIAL BID (In duplicate) in one cover.

Technical and commercial part should clearly indicate the technical details, scope of supply, payment terms, delivery terms. [FOB/FOR/Ex-Works] delivery period, taxes and duties. Warranty, guarantee, security deposit, performance bank guarantee, etc. under separate heads. Please note that the price should NOT be indicated in the Technical and Commercial Offer.

Complete literature/leaflets/catalogues or brochures relevant to the offered models are to be enclosed with the Technical and Commercial Part of the Tender.

The cover should clearly be super scribed "Technical and Commercial Bid". The Tender Number - due Date and Time should also be indicated on the cover.

II. PART II - PRICE BID in one cover:-

Price alone should be indicated (in duplicate). Wherever installation/commissioning is involved, such charges may be indicated separately in the Price Bid.

The cover should clearly be super scribed "Price Bid". The Tender Number - Due Date and Time should also be indicated on the cover.

- III. The "Technical and Commercial Bid" and the "Price Bid" are to be in separate sealed covers and they should be put into a single envelope super scribed with the **Tender Number, Due Date and Time**. The cover thus prepared should be sent to the following address so as to reach us on or before the due date and time specified in the tender form.

The Senior Purchase & Stores Officer
Purchase Unit No. II
Vikram Sarabhai Space Centre
ATF Area, ISRO PO
Trivandrum - 695 022

- IV. Tenders may be hand delivered or sent by post or through couriers. Levels of responsibility and reliability among couriers with respect to the delivery to VSSC are not entirely satisfactory and tenderers shall therefore choose the couriers with particular case.
- V. The offer should be valid for a minimum period of 120 days from the due date.
- VI. **TENDER OPENING** The Technical and commercial Bid will be opened on the specified day and in case any further clarification/discussions are required, such clarifications/discussions shall be called for before opening the Price Bid.
- VII. Late and Delayed Tenders will not be considered. Therefore, please ensure that your tender is posted well in time to reach us before the due date and time.
- VIII. Tenders which are not prepared in terms of these instructions are liable to be rejected.
- IX. Fax offers shall not be considered for TWO PART BIDS.

2) Tender No. 6522-2011-5793

Annexure

Supply of Electrical connectors & Accessories complying to MIL-C-26482 as per Amphenol Part No. given below :-

- | | |
|--|-----------|
| 1) Box mounting receptacles | |
| a) PTO 2H-8-2 P | 600 Nos. |
| b) PTO 2H-12-8P | 300 Nos. |
| 2) Straight plugs | |
| a) With grommet, grommet nut and
Internal strain relief (PTO6E-8-2S(SR)) | 600 Nos. |
| b) With grommet, grommet nut and
Internal strain relief (PTO6P-12-8S(SR)) | 300 Nos. |
| c) With potting boot & ring (PTO6P-8-2S) | 600 Nos. |
| 3) Mounting flange gaskets | |
| a) 10-101949-8 | 1200 Nos. |
| b) 10-101949-12 | 600 Nos. |

Note :-

1. Each type of items specified in 1 (a) & (b), 2 (a), (b) & (c) should preferably belong to a single batch and in any case, should not be drawn from more than 2 batches.
2. Test certificate & MIL compliance certificate are to be furnished along with supply, quoting batch no. of supply without which item shall not be accepted.

3) Tender No. 5524-2011-6158

Annexure

SPECIFICATION FOR TG-DTA

	Specification
Temp range	RT-1500°C
Temp. accuracy	+/-0.5°C
Temp. precision	+/-0.3°C
Sample capacity	200mg minimum
Balance sensitivity	0.1ug
Resolution / Sensitivity µg	0.1 µg
Furnace cooling	1500 to 50 °C within < 30 min
Sample crucible volume	40-100 uL
Heating rate	0.1 to 100°C/min (RT-1000°C)
Calorimetric sensitivity	+/- 2.0%
DTA sensitivity	0.001°C
crucibles	Alumina, Platinum
Calibration standards	High purity standards with test certificate
Mass flow controller for purge/protective gases	Automatic Gas switching with Mass flow controller, flow setting thru software
Atmosphere	inert, oxid., red., vacuum
Upgradability	Upgradable to GC, MS, FTIR (optional) - hyphenated
Software	Windows based Software package for experiment control, data analysis, data storage, data retrieval, TG weight change, onset, Residue, step analysis, Decomposition kinetics, life time prediction etc.
Power requirement	230V, 50 Hz.
Warranty	2 years minimum, Extension of warranty or AMC on expiry of warranty must be ensured.
consumable & spares	Consumables like crucibles, thermocouples for minimum two years
Availability of spares	Availability of Spares and consumables for 10 years minimum must be ensured

SPECIAL CONDITIONS IN RESPECT OF TWO-PART TENDERS

I. PART - TECHNICAL AND COMMERCIAL BID (In duplicate) in one cover.

Technical and commercial part should clearly indicate the technical details, scope of supply, payment terms, delivery terms. [FOB/FOR/Ex-Works] delivery period, taxes and duties. Warranty, guarantee, security deposit, performance bank guarantee, etc. under separate heads. Please note that the price should NOT be indicated in the Technical and Commercial Offer.

Complete literature/leaflets/catalogues or brochures relevant to the offered models are to be enclosed with the Technical and Commercial Part of the Tender.

The cover should clearly be super scribed "Technical and Commercial Bid". The Tender Number - due Date and Time should also be indicated on the cover.

II. PART II - PRICE BID in one cover:-

Price alone should be indicated (in duplicate). Wherever installation/commissioning is involved, such charges may be indicated separately in the Price Bid.

The cover should clearly be super scribed "Price Bid". The Tender Number - Due Date and Time should also be indicated on the cover.

- III. The "Technical and Commercial Bid" and the "Price Bid" are to be in separate sealed covers and they should be put into a single envelope super scribed with the **Tender Number, Due Date and Time**. The cover thus prepared should be sent to the following address so as to reach us on or before the due date and time specified in the tender form.

The Senior Purchase & Stores Officer
Purchase Unit No. III
Vikram Sarabhai Space Centre
RFF Area, ISRO PO
Trivandrum - 695 022

- IV. Tenders may be hand delivered or sent by post or through couriers. Levels of responsibility and reliability among couriers with respect to the delivery to VSSC are not entirely satisfactory and tenderers shall therefore choose the couriers with particular case.
- V. The offer should be valid for a minimum period of 120 days from the due date.
- VI. **TENDER OPENING** The Technical and commercial Bid will be opened on the specified day and in case any further clarification/discussions are required, such clarifications/discussions shall be called for before opening the Price Bid.
- VII. Late and Delayed Tenders will not be considered. Therefore, please ensure that your tender is posted well in time to reach us before the due date and time.
- VIII. Tenders which are not prepared in terms of these instructions are liable to be rejected.
- IX. Fax offers shall not be considered for TWO PART BIDS.

CELL CYCLING SYSTEM

The system is required for automatic life cycling and high current stress cycling Lithium-ion cells for continuous round the clock unmanned operation under ambient environment conditions.

The system shall be based on a dedicated standalone embedded controller with local data storage and communication with a host PC and thus establishing the man-machine interface for initial program configuration setting, real time data display, logging and online data analysis.

The detailed specification is given below:

1.0 SYSTEM RELATED

- 1.1 The system should have 8 individual charge/discharge circuits and each channel should be independent and separately programmable. The system should be upgradeable upto 16 channels in future.
- 1.2 8 channels should be available for cell temperature monitoring. The temperature range is -20 to $+60$ °C and standard YSI thermistor 44006 (10Kohm at 25 °C) will be used for the measurement.
- 1.3 Each circuit should be capable of charging and discharging cells of nominal voltage 0 to 5 volts.
- 1.4 Each circuit should be capable of charging/discharging from 0 to ± 200 A. It should have preferably three current ranges: 0 – 2A, 0-20A and 0 –200 A.
- 1.5 Current and voltage ranges should have a minimum accuracy of 0.1% of the range.
- 1.6 Charging must be done at constant current, constant voltage and voltage limited constant current and discharging at constant current and constant power.
- 1.7 The system should have capability for life cycle test of cells. The system has to continuously charge and discharge the battery for a particular settable number of cycles (with/without idling between charge/discharge). Charge followed by a discharge is one cycle and number of charge discharge cycles has to be counted and displayed.
- 1.8 Data acquisition and storage shall be at interval of minimum 10milli seconds or better (programmable).
- 1.9 Discharging termination at a settable voltage across the cell from 0 to +5V. Provision should be available for charge/discharge termination after the preset time is elapsed or current is dropped to preset value.

- 1.10 The equipment must be able to start from any step, stop or change the steps (charge, discharge, idle) over the entire voltage, current, time and temperature ranges.
- 1.11 The system shall ensure reliable real time operations with deterministic control. (The system has to control and monitor a purely real time process; all operations shall be directly or indirectly based on real time and are very critical).
- 1.12 The controller shall be robust and designed for real-time control & data acquisition and the software platform (OS etc.) can be chosen accordingly. The host PC shall provide a very robust, but user friendly and state-of-art, preferably multitasking, GUI.
- 1.13 The real time display shall have the following parameters

Test parameters	Value	Resolution
No of channels	8	-
Cycles	1-99999	-
Steps	1-99	-
Step time	240 hours	100ms or better
Voltage (V)	0 to 5.0 V	1mV or better
Current (A)	0 to 200.0 A	0.1mA(0-2A range) 1mA(0-20A range) 10mA(0-200A range)
Power (W)	0 to 1000W per channel	1mW
Amp hours	999.99	0.01Ah
Watt hours	999.99	0.01Wh
Temperature	-20 to +60°C	± 0.1 °C (Thermistor)
Status	Charging/discharging/idling	-

- 1.14 Each step is the action to be performed as per the user requirement. Eg. Charging/discharging at different rates within a cycle or at different cycles with different idling time, repeating the action or repeating the cycles etc.)
- 1.15 File name, Cell Tag no (user defined), Power failure status and user defined title shall also be displayed.
- 1.16 In the event of power failure and resumption, the programme should continue from the

phase and time of the phase at which power went off. Duration of power failure and occurrence time should be recorded.

- 1.17 The charge/discharge cut-off conditions should be able to set by voltage current, dV/dt , dT/dt , Ah, temperature and a combination of the above.
- 1.18 Constant current charging should be carried out till pre- set battery voltage and taper charging should continue till battery reaches full charge as specified by end of taper current/time.
- 1.19 Provision for stop, reset and restart at any point of running of the equipment with programme changing facility.
- 1.20 The configuration should allow paralleling of any number of available channels to enable operation at higher currents without affecting the performance.
- 1.21 Executive summary of the test should be displayed for every cycle.
- 1.22 The PC should have the following specification and should be from a standard manufacturer.

Advanced Intel processor

4GB RAM

500GB hard disk or more

48X32X48 CDRW drive

Keyboard and scroll mouse

19" colour LCD monitor

Laser colour printer and cabling

- 1.23 The system shall be assembled in an instrument rack with castor wheels (two numbers lockable). Sufficient air-cooling should be provided.
- 1.24 The maximum length from system to battery under test is approximately 5 meters. Power and monitoring cables shall be extended up to battery terminals. Ring type terminal lugs should be provided for connecting to battery terminals.
- 1.25 The system should have the facility for monitoring the pressure of the cells by means of a 350Ω strain gauge.
- 1.26 Power : $220V \pm 10\%AC$, 50Hz

2.0 Protections

- 2.1 Protection has to be provided against short circuit, high /low set limits exceeding and over load.
- 2.2 System should take care of mains supply failure, PC hanging, watch dog timer to detect PC failure, file writing errors, interface errors, memory overflows and sub system errors.

- 2.3 System should have protections to prevent the discharging of cells through charge/discharge source in case of mains power failure or source failure.
- 2.4 System should detect any of the hardware problems and isolate the cells.
- 2.5 System should be failsafe.
- 2.6 All cell connection terminals should have perfect isolation from earth.

3.0 SOFTWARE RELATED

- 3.1 32bit graphics user interface based software.
- 3.2 Software should be interactive. System configuration should be editable on the screen.
- 3.3 Limit check on input data
- 3.4 Periodic health checks of the sub systems through software.
- 3.5 System software and application software backup should be given in CD's and any improvements in the software done at a later point, the party should be able to give the same at free of cost.
- 3.6 Data should be available both in text and graphic format
- 3.7 Data logging for charged & discharged capacity, current, temp and terminal voltage against each cycle to be provided with provision for printing.
- 3.8 Real-Time Graphic display of all measured parameters should be provided.
- 3.9 Provision to access and display/print the stored data for future applications/analysis.
- 3.10 Summary of the test results shall be available in report form.
- 3.11 Software for data analysis shall be provided.
- 3.12 An additional hard disk for data storage should be provided.

4.0 GENERAL

- 4.1 Since the item is required for testing space quality batteries and only companies having proven track record in the manufacturing of battery cycling unit will be considered.
- 4.2 List of customers to whom similar units were supplied shall be given along with the offer.
- 4.3 Party should have service facility to attend breakdowns within 48 hrs.
- 4.4 Party should give two-year warranty for trouble free operation of the system.
- 4.5 Party should be willing to take AMC after expiry of warranty
- 4.6 Operation, maintenance & software manual, consisting of circuit diagram, component schedule and calibration procedure shall be supplied along with the equipment. Calibration certificate shall be given along with the equipment.
- 4.7 Party should enclose a compliance /deviation matrix with respect to each of the specification along with their offer for easy comparison with out which the offer will not be considered.

- 4.8 Quotation should consist of construction details with well-supported catalogues and leaflets along with make and model number of each components without which their offer will not be considered. Foot print of the system, dimension, weight, mobility and enclosure details to be provided.
- 4.9 Essential spares required shall be available and party has to give standard spare pack required with part number and cost.
- 4.10 Party should give the power requirement of the total system. Mains supply points to all subsystems to be routed through the instrument rack. VSSC will provide UPS power for PC.
- 4.11 Party should install and commission the item at our site, demonstrate the performance and give training to our personnel.
- 4.12 Party has to give break up of the offer. The cost of standard configuration, options. The cost of PC and peripherals, system, software, spares etc.,
- 4.13 Any minor modification required at a later date, the party should be able to accommodate with out additional cost.
- 4.14 Party should strictly stick to the supply schedule.

SPECIAL CONDITIONS IN RESPECT OF TWO-PART TENDERS

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5) Tender No. 5524-2011-6166

Annexure

SPECIFICATION FOR DIFFERENTIAL SCANNING CALORIMETER (DSC)

Methodology	Power Compensated
Modulated DSC	Yes
Temp range	-180 to 725°C
Heating rate	0.01 to 200°C
Cooling rate	0.01 to 150 °C/min controlled
Temp Accuracy	+/- 0.05 °C
Temp Precision	+/- 0.01 °C
Calorimetric performance range	800 mW minimum
Calorimetric Accuracy	Better than 0.2%
Calorimetric Precision	Better than 0.03%
Digital resolution	0.18 µW minimum
Sensitivity	0.2uW
Crucibles	Aluminium, Gold, Alumina, Platinum
Calibration standards	High purity standards with test certificate
Cooling Accessory	Automatic LN2 , quench cooling with LN2, Cryostat, Intracooler, Air cooling (multi options)
High Pressure DSC	Optional
Autosampler	Optional
Photocalorimeter	Optional
Direct Cp measurement	Optional
Gas atmospheres	Inert, oxidizing, static, dynamic
Mass flow controller for purge/protective gases	Automatic Gas switching with Mass flow controller, flow setting thru software
Software	Software packages for experiment control, data analysis for peak integration, onset, glass transition, purity evaluation, isothermal kinetics, specific heat, purity analysis etc.
Upgradability	Upgradable for photocalorimetry, high pressure DSC, Autosampler capability (optional)
Power requirements	230V/50Hz
Warranty	3 years minimum, Extension of warranty or AMC on expiry of warranty must be ensured.
Consumable & spares	Consumables like crucibles, thermocouples for minimum two years trouble free operation
Availability of spares	Availability of Spares and consumables for 10 years minimum must be ensured

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6) Tender No. 5524-2011-6225

Annexure

SUPPLY, INSTALLATION, COMMISSIONING AND TRAINING ON OXYGEN-NITROGEN-HYDROGEN (ONH) ANALYZER

ONH analyzer is an analytical equipment for the quantitative estimation of the elements oxygen, nitrogen and hydrogen in materials such as steels, refractories, nickel alloys, titanium alloys, copper alloys and other metallics. The technique employs inert gas fusion of the sample followed by detection of the evolved gases using either infra red or thermal conductivity detector.

The party should provide their offer in two parts i.e., technical bid and price bid.

Technical Specifications of the item are finalized as follows:

1. **Instrument Range:** Oxygen: Up to 5.0 % or better, Nitrogen: Up to 3.0% or better, Hydrogen: Up to 2500 ppm or better
2. **Principle/detection method:** Inert gas fusion of the sample followed by detection using either non-dispersive infrared detector and/or thermal conductivity detector
3. **Accuracy:** ± 1.0 % or better
4. **Precision:** ± 0.5 % or better
5. **Sensitivity:** 0.001 μg / g or better
6. **Furnace Power:** Furnace should be designed with sufficient power as to ensure complete melting of the samples (steels, refractories, nickel alloys, copper alloys and titanium alloys) during analysis.
7. **Coolant:** There must be provision for suitable cooling system to prevent overheating of the equipment.
8. **Calibration:** There must be provision for calibration of the equipment for the specified instrument range. Calibration standards for analysis of steels, refractories, nickel alloys, titanium alloys and copper alloys, covering the entire range must be quoted along with the instrument.
9. **Electronic balance:** An electronic balance (sensitivity: 0.001 gm or better) and suitable interface kit must be provided along with the instrument.
10. **Instrument operation/control:** A computer with monitor should facilitate control of the instrument and accessory if any, through genuine software. A computer with the latest

Pentium processor (i5 or better) at the time of supply should be provided along with a colour laser printer. Cost of the PC and related peripherals should be quoted separately along with detailed configuration.

11. **Software control:** Software for controlling the instrument operation, data analysis and retrieval should be provided along with the instrument. It should have extensive setup templates and wizards, on-line help menus with diagnostics and multimedia support. Software for data analysis should include real time data analysis, auto analysis, ability to create curve overlay plots, customer report generator using Microsoft Word and Excel templates, spreadsheet text files, and the ability to export ASCII data files. Results of the analyses and raw data should be able to obtain in the printable form. The control and data analysis software should be able to be loaded in any Windows-based computer. The party should undertake, free of cost, all software up-gradations in future.
12. **Electrical power:** The entire supply should work on 215V ($\pm 10\%$), 50Hz, single-phase supply
13. **Safety interlocks:** The entire supply must be designed with all necessary safety interlocks and earthing for operators' safety.
14. **General Conditions: The party should provide/guarantee the following:**
 - **Testing of the samples provided by VSSC, in the quoted model of the instrument**
 - **Computer with monitor, colour laser printer, stabilizer and UPS with SMF batteries, all of Indian origin, from local supplies ensuring maintenance service from local representatives of the same**
 - **Sufficient number of gas regulators required for instrument operation**
 - **Pre-installation requirements**
 - **Installation (with the aid of tools and accessories provided from the supplier/company), commissioning and on-site user training in instrument operation at VSSC site**
 - **Maintenance kits, original brochures/specification sheets in English (obtained directly from the principal manufacturer of the quoted model), operation/maintenance manual, trouble-shooting flowchart, detailed description of the control system (soft and hard copy) and full certifications (ISO, calibration certificate and traceability certificate for any standards used for calibration)**
 - **Quotation of any optional accessory advised for better functioning of the equipment**
 - **Price list of recommended set of spare parts and consumables for two years operation**
 - **Warranty of the entire supply, for free repair/ replacement, for two years from the date of installation, commissioning and acceptance by VSSC**
 - **AMC of the equipment by authorized service personnel after the warranty period as per VSSC rules and inclusion of AMC charge in the quotation**

- Replacement (free of cost) of spares taken from our stock during guarantee period
- Year of introduction of the quoted model
- User's list (including name and contact details) of the instrument, both in India and abroad
- Readiness to adhere strictly to schedules for supply and to accommodate any minor modification if required
- Compliance matrix

SPECIAL CONDITIONS IN RESPECT OF TWO-PART TENDERS

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7) Tender No. 6562-2011-6232

Annexure

High Density – Isotropic Graphite. Size : Dia 115 x 140 mm Long (Qty : 300 Nos.)

UT and RT Testing charges shall be quoted separately.

Quantity tolerable +/- 5% is acceptable.

SPECIFICATIONS

Density: gm/cc	1.88 (min)
Shore hardness (Shore D)	80 TO 90
Flexural strength (MPa)	50 (min)
Compressive strength (MPa)	150 (min)
Erosion rate (mm/s)	0.012 (max)
Modulus (MPa)	13000 (min)
Velocity (m/s)	2650 (min)

Note:

Parties need to quote for graphite rods meeting the above specification only. FRIWAY – China make graphite is not acceptable.

The quotation is of two parts. The first part is technical bid and second part is price bid. Vendor should provide quotation in two parts. Technical bid should consists of Technical details of supply of graphite, catalogue, minimum guaranteed properties and one number each of Dia 25 mm x 50 mm long cylinder & 25 mm cube graphite specimen. After review and approval of technical bid of the concerned vendor only price bid will be opened.

Technical bid will not be approved in the absence the followings.

- a. Technical details of supply of graphite.
- b. Catalogue
- c. Minimum guaranteed properties and
- d. one number each of Dia 25 mm x 50 mm long cylinder & 25 mm cube graphite specimen

TERMS AND CONDITIONS

1. 100% Radiography and 100% Ultrasound (DCPE-UT) scanning to measure velocity & Modules of all the 300 numbers to be measured from Govt or VSSC approved parties like M/s Scannray Metallurgical services, Chennai (044 – 2625 0651), M/s RAP, Vijayawada. The report to be submitted and obtained the approval before despatch of graphites. The specification and Method of Radiography and DCPE-UT are as given below. **RT AND UT TESTING IS APPLICABLE TO THE PARTIES WHO REQUIRES 90% PAYMENT AGAINST THE DELIVERY.**
2. The final acceptance of the supply shall be based on evaluation of physical, mechanical and thermal properties of the materials at VSSC for their conformance to specifications.
3. **The properties specified in item 2 will be tested from the graphite rods supplied in bulk also. If the properties of the materials not confirming to the minimum properties specified, the lot supplied will be totally rejected and the PO shall be cancelled.**
4. Graphite block shall be inspected by VSSC personnels. From **each block – 3 nos. of dia 115 x 140 mm long rod**, 6 nos. of compression test specimen, 6 nos. of flextural strength test specimen, 6 nos. of erosion test specimens as per enclosed drawings and 6 nos. of density test specimen of size 25 mm cube to be supplied to VSSC at the time of block inspection. Only after approval of the graphite block, the graphite rods to be machined X Ray and DCPE-UT report of all the three rods and specimens to be depatched along with specimen.
5. Sample should be submitted within 30 days of PO and Bulk supply should be effected within 30 days of Approval of Samples. The PO shall be cancelled without further communication if the sample supply and bulk supply schedule is not met.

SPECIFICATIONS AND METHOD OF RADIOGRAPHY FOR GRAPHITE RODS

- | | |
|------------------------|---|
| 1) NDT Method | - X Ray radiography |
| 2) Machine capacity | - 250 KV minimum |
| 3) Radiography method | - Vertical shot - 1 no and Horizontal shot- 2 nos. 90 ° apart |
| 4) Filter | - D 7 or equivalent |
| 5) Film density | - 2 to 2.5 H & D |
| 6) Intensifying screen | - 0.1 mm lead screen to be used. |
| 7) IQI | - Step hole type Image quality indicator to be used. |

Note:

1. X Ray film to be processed at 20 deg Celsius in fresh chemicals with continuous agitation during developing.
2. OD of the graphite rod may be masked / covered by lead screen or machined aluminum ring to reduce scattered radiation reaching the film in axial radiography.
3. IQI may be made of graphite or Perspex.
4. Occurrence of film artifacts and spurious indications in the radiograph, which are likely to obscure defects are to be avoided.
5. Low density material like thermo Cole is to be used for arresting the movement of the objects during radiography in order to avoid their indication appearing in the radiograph.
6. The report has to be made with thorough review of the radiographs with precise interpretation of the defects observed with reference to the Identification numbers provided.
7. **The graphite rods are to be radiographed to find out the presence of internal defects such as voids, cracks, sponginess, inclusions etc.,**
- 8) **3 numbers of graphite pieces are to be radiographed initially and the report and radiograph will be perused and approved by VSSC NDT Experts. Only subsequent to this stage the remaining quantity of graphite pieces are to be radiographed.**

VSSC Approved party is M/s Scaanray Metallurgical Services (p) Ltd., C12, Ind. estate, Mogappair(w), Chennai-600 050. Phone no. 044 – 2625 0651 and Tele Fax – 044 2635 8741, E-mail – Scaanray@vsnl.com

**PROCEDURE FOR DRY COUPLED PULSE ECHO (DCPE-UT) ULTRASONIC
EVALUATION OF GRAPHITE ROD**

1.0 Name of the Product/component:

Cylindrical Graphite rod.

2.0 Dimensions of the Products:

Height : 150mm (max)

OD : 120mm (max)

(After machining to hollow cylindrical shape)

3.0 Objective of inspection:

- a. Detection of defects in the volume of the material.
- b. Measurement of ultrasound velocity and estimation of elastic modulus in axial and radial direction.
- c. Measurement of attenuation in comparison with reference blocks.

4.0 Equipment:

Conventional portable ultrasonic equipment of reputed manufactures like M/s Krautkramer or any other reputed manufacturer.

Note:- The equipment selected should have transparent track record of use. If inspection is using an equipment of third party, prior to use, the conditions of the equipment has to be demonstrated by the operator.

4.1 Operator:

A graduate/diploma in relevant subject with one year experience OR six month experience and formal training. The operator capability is to be shown by demonstration of calibration of equipment and interpretation of the results, if done outside VSSC by third party.

5.0 Transducers:

1 MHz transducers (of 24dia) and cables of M/s Krautkramer, Germany or any other reputed manufacturer.

(For special investigation on observed defects other suitable transducers can also be used)

6.0 Fixing of Dry couplant and scanning with Dry Couplant:

Training will be given to operator to fix the dry couplant face to the probe.

Methodology of scanning using dry couplant will be inducted to operator.

Note: The dry couplant can be fixed very easily to the probe face by pressing.

For moving the probe on the material (Graphite), it is as we are moving the

probe on the metallic materials with pressing force to have a uniform contact.

For restricting the speed of movement of the probe, scanning has to be done by lifting the probe and placing in the next scanning location.

7.0 Reference Blocks:

The details of reference blocks are given below:

1. 10 dia flat Bottomed Hole (FBH) at 180mm Beam Path (BP).
2. 10 dia FBH at 80mm BP.
3. 10 dia FBH at 30mm BP.

8.0 Calibration with Reference Blocks and Preparation of distance Dependent Threshold.

The amplitude of reflector (HERE 10 DIA fbh) ECHO SIGNAL DEPENDS ON ITS RELATIVE DISTANCE (Beam Path) from the probe and therefore an evaluation threshold (gain in dB or % of full screen Height-FSH-of signal) can not be kept constant but also allowed to vary with distance. Ultrasound response measurement has to be done for each of the FBHs of the ref. Blocks.

The value has to be reported as in the example shown below.

- i. BP 180mm/ 57dB/80% FSH/10 dia FBH.
- ii. BP 80mm/ 45dB/80% FSH/10 dia FBH.
- iii. BP 30mm/ 35dB/80% FSH/ 10 dia FBH.

9.0 Inspection Plan for Defect Detection:

9.01 Axial Direction: (permanent sectors are to be marked on the job using glass marking pencil).

Inspection in axial direction is to be done in two halves (ie. From both TOP and BOTTOM). If height of the TG is less than 250mm, inspection with 50& 100 mm

9.13 Inspection of Sector up to 50mm:

Steps:

- I. Set up the equipment screen for 50 mm range.
- II. Place the probe on 50 mm ref. Block.
- III. Check the calibration as per section 8.
- IV. Give additional 10dB gain in the equipment.
- V. Record all indications which are above 40% FSH at this screen.

Step (vi) is same as for 200 mm range.

Note:- There should be 75% over lap between adjacent probing locations to get full coverage.

9.2 Inspection from Bottom Side

Same as in section 9.1

9.3 Inspection from OD side

- | | |
|-----------------|--|
| Step (i) | Set up the equipment for 100 mm (or appropriate) range using a graphite Block cut in the radial direction or on the product. |
| Step (ii) | Place the probe on 100 mm ref. Block with 10 dia FBH. |
| Step (iii) | Check the calibration as shown in the section-8. Here the Beam Path (BP) will be high or low because of the velocity difference in radial direction. |
| Step (iv) | Give additional 20 dB gain in the equipment. |
| Step (v) | Record all indicators which are above 70% FBH at this screen. |

Note:- There should be 50% over lap between adjacent probing locations to get 100% coverage.

10.0 Recording of Defect indications:

Defects responses are to be recorded. Physical locations of the defects marked on the job has to be transferred to paper sketch.

10.1 Inspection plan for velocity measurement and estimation of elastic modulus.

- 10.11 From TOP or BOTTOM face: 9at appropriate gain to get the back wall Echo between 100% to 20% FSH)

Steps:

- i. The screen shall be set to the 400 mm range (or appropriate range to suit the height of the particular TG)
- ii. Scan 100% TOP or BOTTOM face.
- iii. Record minimum and maximum velocity location on the sketch.
- iv. Compute the elastic modulus.

- 10.12 From OD face: (at appropriate gain to get the back wall echo between 80% to 20% FSH)

Steps:

- i. Set the equipment screen to 100 mm range (or an appropriate range to suit the wall thickness of the TG)
- ii. Scan 100% surface area from OD.
- iii. Record minimum and maximum velocity location on the sketch.
- iv. Compute the elastic modulus.

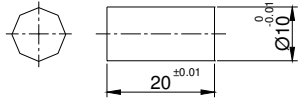
11.0 Inspection Plan for recording Attenuation variation:

While doing the measurement of section 11.0 the Back Wall Echo (B.E) height can be recorded for locating drastic variation. Prior to scanning, BE height can be measured and recorded on identified location of 100 and 200 mm blocks. Total loss of Back Wall Echo (BE) at any one location is a minor concern. Very low BE can be reported if present in an region. A trend analysis of previous TGs can also made for monitoring this aspect. If major variations are seen compared to previous cases that can be reported.

12.0 Reporting:

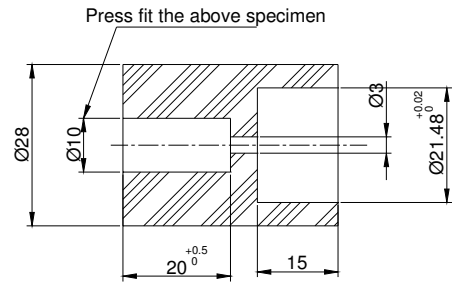
Appropriate details can be reported with full recording of information, as detailed in the document, in log book for future verification and comparison with future products of same types of graphite and application.

		4	3	2	1		
F	LENGTH IN mm OF SHORTER SIDE OF ANGLE						
	UPTO 6	±1°	30-120	±20°	120-400	±10°	
E			6.30	±30°			
			4000	ABOVE			
D			2000	4000			
			1000	2000	±1.2		
C			315	1000	±0.8		
			120	315	±0.5		
B			30	120	±0.3		
			6	30	±0.2		
LENGTH OR DIA.				UPTO 6	±0.1		
		ITEM NO	DISCRIPTION		MATERIAL	QTY	WT.
		MATERIAL		TITLE		NO. OFF	Wt.Kg.
		Graphite		Graphite (Thermal Properties Test Specimens)			
A	DGN		GOVERNMENT OF INDIA		DIVISION		
	DRN.		INDIAN SPACE RESEARCH ORGANISATION		SMG		
	TRD		VIKRAM SARABHAI SPACE CENTRE TRIVANDRUM				
		CHD.		DRG. No			
		APPD.		SMAF/SPM/HATF/NC/180402			
		SIGN	DATE	SCALE 1:1		SHEET OF	



(Along grain-3 Nos, Across grain-3 Nos.)
Qty:3x2=6 Nos.

Erosion Rate Specimen



Qty:3 Nos.

Holder for Erosion Rate Specimen

SPECIAL CONDITIONS IN RESPECT OF TWO-PART TENDERS

I. PART - TECHNICAL AND COMMERCIAL BID (In duplicate) in one cover.

Technical and commercial part should clearly indicate the technical details, scope of supply, payment terms, delivery terms. [FOB/FOR/Ex-Works] delivery period, taxes and duties. Warranty, guarantee, security deposit, performance bank guarantee, etc. under separate heads. Please note that the price should NOT be indicated in the Technical and Commercial Offer.

Complete literature/leaflets/catalogues or brochures relevant to the offered models are to be enclosed with the Technical and Commercial Part of the Tender.

The cover should clearly be super scribed "Technical and Commercial Bid". The Tender Number - due Date and Time should also be indicated on the cover.

II. PART II - PRICE BID in one cover:-

Price alone should be indicated (in duplicate). Wherever installation/commissioning is involved, such charges may be indicated separately in the Price Bid.

The cover should clearly be super scribed "Price Bid". The Tender Number - Due Date and Time should also be indicated on the cover.

- III. The "Technical and Commercial Bid" and the "Price Bid" are to be in separate sealed covers and they should be put into a single envelope super scribed with the **Tender Number, Due Date and Time**. The cover thus prepared should be sent to the following address so as to reach us on or before the due date and time specified in the tender form.

The Senior Purchase & Stores Officer
Purchase Unit No. III
Vikram Sarabhai Space Centre
RFF Area, ISRO PO
Trivandrum - 695 022

- IV. Tenders may be hand delivered or sent by post or through couriers. Levels of responsibility and reliability among couriers with respect to the delivery to VSSC are not entirely satisfactory and tenderers shall therefore choose the couriers with particular case.
- V. The offer should be valid for a minimum period of 120 days from the due date.
- VI. **TENDER OPENING** The Technical and commercial Bid will be opened on the specified day and in case any further clarification/discussions are required, such clarifications/discussions shall be called for before opening the Price Bid.
- VII. Late and Delayed Tenders will not be considered. Therefore, please ensure that your tender is posted well in time to reach us before the due date and time.
- VIII. Tenders which are not prepared in terms of these instructions are liable to be rejected.
- IX. Fax offers shall not be considered for TWO PART BIDS.